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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Ikuya Miyamoto

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12/03/2007

STAAS & HALSEY LLP

SUITE 700

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EXAMINER

LEE, RIP A

ART UNIT

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1796

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12/03/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/517,828	Applicant(s) MIYAMOTO, IKUYA	
	Examiner Rip A. Lee	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-12 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-12 is/are rejected.
- 7) ☒ Claim(s) 7 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

This office action follows a response filed on September 19, 2007. Claims 1, 2, and 4-12 remain pending. The indicated allowability of claims has been withdrawn in view of newly discovered references and reconsideration of the cited prior art.

Claim Objections

1. Claim 7 is objected to because of the following informalities: Claim 7 is a substantial duplicate of claim 4. Appropriate correction is required.
2. Claim 9 is objected to because of the following informalities: Claim 9 is a substantial duplicate of claim 5. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1, 2, and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dontula *et al.* (U.S. 6,841,226) in view of Hasegawa *et al.* (*J. Appl. Polym. Sci.*, 1998), and further in view of extrinsic evidence furnished in Anno *et al.* (U.S. 6,475,690).

Dontula *et al.* teaches a composition comprising a polyethylene melt-blended with smectite clay intercalated with oxylated alcohol waxes (ethoxylated alcohols); see col. 5, lines 54-62. The reference does not teach use of modified polyolefin. However, at the time the invention was made, use of compatibilizing agent for making polyolefin-clay nanocomposite materials was well-established art. Hasegawa *et al.* teaches polyethylene-based nanocomposites wherein compatibilizing agent is also used to improve dispersion of filler. Where compatibilizing agent is not used, the composition suffers reduced melt strength. The compatibilizing agent of choice is a maleic anhydride-modified polypropylene oligomer, designated PP-MA (page 87).

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It would have been obvious to one having ordinary skill in the art to incorporate compatibilizing resin, PP-MA, of Hasegawa *et al.* in the composition of Dontula *et al.* in order to attain homogeneous dispersion of the layered silicate filler, and since this practice is well-known in the art, one having ordinary skill in the art would have expected such a combination to work with a reasonable expectation of success. The amount of compatibilizing resin is not established, however, from the examples, one finds that 7 wt % and 22 wt % are practical working amounts, and one of ordinary skill in the art would have found it obvious to vary the amount of compatibilizing resin accordingly in order to achieve appropriate dispersion of clay particles. Since the amount of filler and compatibilizing resin are known result-effective variables (MPEP 2144.5), the choice of a particular amount of either component (such as the amount in present claims) is a matter of routine experimentation and would have been well within the skill level of, and thus obvious to, one of ordinary skill in the art.

Hasegawa *et al.* does not disclose the spectral properties of PP-MA. The instant claims indicate that the hydrogen bonding modification degree, P_{CH} , defined as $I_{CO2}/(I_{CO1} + I_{CO2})$, is 0.80 or more. This equation indicates that the intensity of the stretch frequency of the free acid carbonyl group is at least 80 % of the sum of intensities of stretch frequencies of carboxylic anhydride carbonyl groups and free acid carbonyl groups. A compatibilizing resin which would satisfy this relationship would have a significant amount of free acid groups. From the specification, one such resin is Hi-wax 2203, which is known to have an acid value of 30 (see Anno *et al.*, col. 5, line 24). The PP-MA of Hasegawa *et al.* has an acid value of 52 (page 87); and compared with Hi-wax 2203, it is reasonable to conclude that PP-MA contains a significant amount of free acid relative to carboxylic anhydride. In light of these data, a reasonable basis exists to believe that PP-MA of the prior art exhibits the claimed spectral features. Since the PTO can not conduct experiments, the burden of proof is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

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5. Claims 1, 2, and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dontula *et al.* (U.S. 6,841,226) over Mehta *et al.* (U.S. 6,844,389).

Dontula *et al.* teaches a composition comprising a polyethylene melt-blended with smectite clay intercalated with oxylated alcohol wax (ethoxylated alcohols); see col. 5, lines 54-62. The reference does not teach use of modified polyolefin. However, at the time the invention was made, use of compatibilizing agent for making polyolefin-clay nanocomposite materials was well-established art. Mehta *et al.* teaches polyethylene-based nanocomposites wherein compatibilizing agent is also used to improve dispersion of filler. Where compatibilizing agent is not used, the composition suffers reduced melt strength. The compatibilizing agent of choice is a compatibilizing agent that is a polymer of ethylene having from 0.1-8 wt % of ethylenically unsaturated carboxylic acid monomer copolymerized therewith or grafted thereto (claim 1). The inventors teach maleic acid as the unsaturated carboxylic acid monomer (col. 6, line 27). It would have been obvious to one having ordinary skill in the art to use polyethylene grafted with about 0.1-8 wt % of maleic acid, taught in Mehta *et al.* in the composition of Dontula *et al.* in order to attain homogeneous dispersion of the layered silicate filler, and since this practice is well-known in the art, one having ordinary skill in the art would have expected such a combination to work with a reasonable expectation of success. With respect to the amount of compatibilizing resin, Mehta *et al.* teaches a working amount of 0.25-12 wt % of compatibilizing agent is acceptable for preparing polyethylene-clay nanocomposites. Thus, one of ordinary skill in the art would have found it obvious to use this amount since it is shown to work.

Mehta *et al.* does not disclose the spectral properties of the maleic acid grafted polyethylene. The instant claims indicate that the hydrogen bonding modification degree, P_{CH} , defined as $I_{CO2}/(I_{CO1} + I_{CO2})$, is 0.80 or more. Since the maleic acid grafted polyethylene is substantially free of carboxylic anhydride carbonyl groups, the term I_{CO1} in denominator vanishes, such that the value of P_{CH} would be unity. The claims also recite the relationship that P_{C1} , defined as $(I_{CO1} + I_{CO2})/I_{CH2}$, lie in the range of 0.03 to 0.100. Although the intensity of the IR band is not directly related to molar quantities, the equation indicates that there must be a minor amount of grafted maleic group such that the intensity of band due to carbonyl groups is

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10 % of the intensity due to CH stretching. It would appear that compatibilizer of Mehta *et al.*, which contains up to 8 wt % of maleic acid, exhibits such a relationship. Since the PTO can not conduct experiments, the burden of proof is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

6. Claims 1, 2 and 4-12 are rejected under 35 U.S.C. 102(e) as anticipated by, or in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Mehta *et al.*

Mehta *et al.* teaches polymer nanocomposites wherein the base resin is an ethylene homopolymer or ethylene copolymer (LDPE, LLDPE, HDPE, and metallocene prepared plastomers). Intercalated clay is commercially available Cloisite[®] clays that have been ion exchanged with onium salts such as 2M2HT. Compatibilizing agent is also used to improve dispersion of filler. This component is prepared by grafting *via* peroxides about 0.1-8 wt % of maleic acid onto base resin such as polyethylene. Mehta *et al.* does not disclose the spectral properties of the maleic acid grafted polyethylene, however, a reasonable basis exists to believe that the grafted polyethylene exhibits the claimed features (*vide supra*). Since the PTO can not conduct experiments, the burden of proof is shifted to the Applicants to establish an unobviousness difference. *In re Fitzgerald*, 619 F.2d. 67, 205 USPQ 594 (CCPA 1980). See MPEP § 2112-2112.02. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

The subject matter of the claims remains rejected over Mehta *et al.* because the amended phrase is presented in product-by-process form. It is well settled that where product by process claims are rejected over a prior art product that appears to be the same, the burden is shifted to the Applicant to establish an unobviousness difference, even if the production processes are different.¹ Furthermore, the patentability of a product claim rests on the product formed, not on the method by which it was produced.² That is, absent any showing of criticality or unexpected results, there appears to be no substantial difference between compositions in which clay is intercalated with onium ion or with non-ionic surfactant.

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7. Claims 1, 2, 5, 8, 11, and 12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over *et al.* (*J. Mat. Sci. Letts.*, 1996).

Kurokawa *et al.* discloses a composition comprising a melt blend of polypropylene base resin, maleic acid modified polypropylene (compatibilizing resin), and modified clay, wherein the amount of filler is 3 wt % (page 1483). Since equal amounts of maleic acid modified polypropylene and modified clay are pre-mixed, it follows that the composition contains 3 wt % of maleic acid modified polypropylene. The reference is silent with respect to the spectral properties of the compatibilizing resin, however, in view of the fact that the compatibilizing resin is prepared with maleic acid, and not maleic anhydride, a reasonable basis exists to believe that it exhibits properties Pc1 and PcH, as recited in the claims. Since the PTO can not conduct experiments, the burden of proof is shifted to the Applicants to establish an unobviousness difference. *In re Fitzgerald*, 619 F.2d. 67, 205 USPQ 594 (CCPA 1980). See MPEP § 2112-2112.02. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

The subject matter of the claims remains rejected over Mehta *et al.* because the amended phrase is presented in product-by-process form. It is well settled that where product by process claims are rejected over a prior art product that appears to be the same, the burden is shifted to the Applicant to establish an unobviousness difference, even if the production processes are different.¹ Furthermore, the patentability of a product claim rests on the product formed, not on the method by which it was produced.² That is, absent any showing of criticality or unexpected results, there appears no substantial difference between compositions in which clay is intercalated with onium ion or non-ionic surfactant.

¹ *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

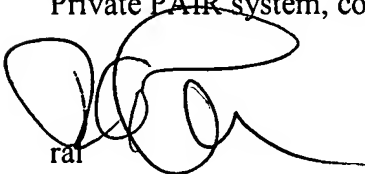
² *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu S. Jagannathan, can be reached at (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



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November 29, 2007